Claims

1. A method for simulating musculoskeletal strains on
    a patient, especially for preparing or monitoring
5   surgical interventions and/or for planning or
    monitoring rehabilitation, said method comprising
    the following steps:

    a. Determination of individual musculoskeletal
10   parameters of the patient, particularly by
       automatic measurement of anthropometric
       parameters, automatic derivation of
       anthropometric parameters from a system for
       computer-assisted surgery, particularly a
15   surgical navigation system, and/or the
       position and/or orientation of joints;

    b. Automatic determination of the individual
       musculoskeletal strains from the determined
20   musculoskeletal parameters of the patient;

    c. Computer-assisted evaluation of the individual
       musculoskeletal strains in respect of at least
       one target criterion, particularly in respect
       of the contact forces or the degree of movement
25   of a joint or in respect of the fragment
       movements of a fracture.

2. The method as claimed in claim 1, comprising the
30 following additional steps:

    d. Variation of at least one musculoskeletal
       parameter, particularly the position and/or
       orientation of a joint;

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    e. Renewed automatic determination of the
       individual musculoskeletal strains taking into
       consideration

the at least one varied musculoskeletal
parameter;

f. Renewed computer-assisted evaluation of the
individual musculoskeletal strains in respect
of the at least one target criterion.

3. The method as claimed in claim 2, characterized in
that steps d. to f. are repeated until a specified
target value of at least one target criterion is
reached.

4. The method as claimed in claim 3, characterized in
that the musculoskeletal parameters corresponding
to the target value are output on an output unit,
stored in a storage unit and/or transferred to a
computer-assisted surgery system and/or to a
surgical navigation system.

5. The method as claimed in claim 3 or 4,
characterized in that the individual and varied
musculoskeletal parameters corresponding to the
target value serve as a basis for planning a
surgical intervention, particularly as a basis for
the choice of components, the positioning of
components or the decision regarding the removal
of temporary implants.

6. The method as claimed in one of claims 2 through
5, characterized in that the variation of the
individual musculoskeletal parameters in step d.
is carried out taking into consideration
predefinable data for implants, particularly their
dimensions and ranges of movement.

7.   The method as claimed in one of the preceding claims, characterized in that, for the automatic determination of the individual musculoskeletal strains, the individual and the varied musculoskeletal parameters are compared with musculoskeletal reference parameters filed in a database, and musculoskeletal reference strains corresponding to the musculoskeletal reference parameters are determined as the individual musculoskeletal strains.

8.   The method as claimed in claim 7, characterized in that the musculoskeletal reference parameters are present as discrete values in the database.

9.   The method as claimed in claim 8, characterized in that the musculoskeletal reference parameters are compared with the individual musculoskeletal parameters by means of functional relationships, particularly by means of interpolation.

10.   The method as claimed in one of the preceding claims, characterized in that the individual musculoskeletal strains are calculated from the determined individual musculoskeletal parameters.

11.   The method as claimed in claim 10, characterized in that a biomechanical and/or a mathematical model is used as a basis for the calculation of the individual musculoskeletal strains.

12.   The method as claimed in claim 11, characterized in that the biomechanical and/or mathematical model is adapted to the individual musculoskeletal parameters.

13.   The method as claimed in claim 11 or 12,
characterized in that the biomechanical and/or
mathematical model is chosen on the basis of the
determined individual musculoskeletal parameters
from at least one database.

14.   The method as claimed in one of claims 11 through
13, characterized in that the individual
musculoskeletal strains are calculated with the
aid of a musculoskeletal model taking into
consideration the individual patient anatomy.

15.   The method as claimed in one of the preceding
claims, characterized in that the individual
musculoskeletal strains are visualized for
evaluation.

16.   The method as claimed in one of the preceding
claims, characterized in that the individual
musculoskeletal strains are presented on the basis
of an anatomical model, particularly in graph form
and/or numerically.

17.   The method as claimed in one of the preceding
claims, characterized in that, by evaluation of
the individual musculoskeletal strains, a
rehabilitation process is evaluated and/or
managed, particularly by means of Internet access.

18.   The method as claimed in one of the preceding
claims, characterized in that the individual
musculoskeletal parameters of the patient are
determined by measurements.

19. The method as claimed in claim 18, characterized
    in that at least one of the individual
    musculoskeletal parameters is measured
5   automatically, particularly by image analysis,
    computed tomography and/or motion sensors.

20. The method as claimed in one of the preceding
    claims, characterized in that individual movement
10 parameters, particularly gait parameters, are
    determined, and these are used for the automatic
    determination of individual musculoskeletal
    strains.

15 21. The method as claimed in claim 20, characterized
    in that the individual gait parameters are
    determined from personal data stored in a database
    and/or are recorded individually for one person.

20 22. The method as claimed in one of the preceding
    claims, characterized in that the position and/or
    orientation of joints are used for a navigation
    system for computer-assisted surgery and/or the
    data from a navigation system are used for
25 computer-assisted surgery.

23. A device for evaluating musculoskeletal strains on
    a patient, with means for carrying out the method
    as claimed in one of the preceding claims.

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24. A movement analysis system, in particular a gait
    analysis system, characterized in that it is
    coupled to a device as claimed in claim 23.

25. A navigation system for computer-assisted surgery
     for carrying out the method as claimed in claims 1
     through   22.